

A SUPPLEMENT TO **ARMY MIDAIR COLLISIONS**



USAAAVS
REPORT 71-1

Covering the period
November 1969
to November 1971

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**A SUPPLEMENT TO ARMY MIDAIR COLLISIONS
REPORT 71-1**

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Technical Report 71-1 (Supplement)



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A SUPPLEMENT TO ARMY MIDAIR COLLISIONS REPORT 71-1 Covering the period November 1969 to November 1971

This report is an update of the "Army Midair Collisions" report published by USABAAR in October 1970. The original report covered the period January 1963 to November 1969 and included the following summary: "Analysis of 56 midair collisions experienced by the Army revealed that multiple cause factors were present in each accident. It was found the pilots must shoulder the majority of the responsibility for midair collisions. However, it was also found that other factors contributed to the crew errors which resulted in collisions. The full extent that other factors contributed could not be accurately determined because of the tendency of aircraft accident investigation boards and reviewing officials to accept pilot error as the cause of accidents, without seeking other contributing factors.

"General problems encountered in training areas stem from the aircraft saturation within high density areas. Corrective actions to eliminate the problems must be oriented toward reducing aircraft densities in specific training areas. This can be accomplished either by a reduction in the number of aircraft operating in a specific area or through the expansion or relocation of existing facilities.

"The most common trend revealed by analyses of accidents in tactical areas was the failure of aviation units to enforce adherence to published regulations. In most cases, adequate operational procedures were established in unit SOPs, field manuals, and technical manuals. Adherence to approved procedures would have prevented most of the midair collision accidents.

"Inadequate command, control, and supervision were present in 50% of the midair collisions studied. It was determined that increased command attention must be directed toward the fundamentals of good aimanship, i.e., see-and-be-seen. In addition, new approaches must be taken to improve aircraft visibility and detection. Prominent among these are installation of proximity warning devices, installation of aircraft high intensity lights, and the installation of improved communication systems in air traffic control towers."

This report covers the period 1 November 1969 to 1 November 1971, during which the Army experienced 17 more midair collisions. The cost of these collisions was 88 fatalities and 26 destroyed aircraft. The aircraft hardware loss was \$7,719,802 (average collision cost of \$454,106.)

Analysis revealed that conclusions and recommendations resulting from midair collisions during training missions are not applicable in all respects to midair collisions occurring in a troop lift/tactical environment. For this reason, this report is presented in two parts. Detailed findings and conclusions on troop lift/tactical situations are contained in Annex I and those on training are in Annex II.

The majority of the cause factors and recommendations brought out in this report were also brought out in the first midair collision study. It is evident that aviators, as well as supervisors, have disregarded these past recommendations. If they continue to do so, Army aviation will continue to be plagued with midair collisions.

ANNEX I

TROOP LIFT/TACTICAL

COMPARISON: During the time frame of the previous midair collision study, 31 (55%) of the 56 accidents occurred in a troop lift/tactical environment. During this reporting period, 14 (82%) of the 17 midair collisions occurred in the troop lift/tactical environment. This represents an increase of 27%.

FINDINGS:

1. The majority of the midair collisions occurred during periods of excellent visibility. This is not unusual since the majority of missions flown in the combat zone are conducted under these conditions. Following are types of conditions and number of collisions in each:

CONDITIONS	NUMBER OF COLLISIONS
Day, excellent visibility	8
Night, reduced visibility	3
Day, weather/dusk	3

Two of the three night collisions involved AH-1G armed helicopters. Three factors evident in these mishaps were:

- Loss of visual contact between aircraft of the light fire team while conducting fire support missions.
- Lack of adequate altitude separation between flare ship and gun ship.
- Lack of adequate communications between flare ship and gun ship.

2. The 14 collisions involved a total of 28 aircraft. Six aircraft were assigned to other services:

SERVICES	NUMBER OF AIRCRAFT
Army	22
Air Force	2
Air America	1
Vietnamese Air Force	2
Korean	1

Three of the midair collisions between an Army aircraft and an aircraft from another service occurred while both were under tower control. Two occurred on joint operations.

3. Time of day appeared to have little, if any, influence on midair collisions. In the first report, approximately one-third of the collisions occurred between 1500-1900 hours and it seemed possible that there was a connection between prime recovery peri-

ods and midairs. However, that association did not prove valid in this reporting period.

TIME OF DAY	NUMBER OF COLLISIONS
0500 - 0700 hours	1
0700 - 0900 hours	3
0900 - 1100 hours	1
1100 - 1300 hours	2
1300 - 1500 hours	2
1500 - 1700 hours	1
1700 - 1900 hours	1
After 1900 hours (night)	3

Three of the 14 midair collisions occurred during formation flight and one occurred when a scout team attempted to depart in formation. These four midairs occurred during the hours of 0500 and 0900.

4. Fatigue was not an established cause factor in any of the midair collision reports. However, analysis revealed that the pilot in command of 13 of the 22 Army aircraft involved had flown in excess of 90 hours during the 30-day period prior to the accident. Of these 13, 11 aviators had exceeded 100 flight hours. Their total flight time for the 30-day period prior to the accident ranged from 100 to 157 hours. Accident reports made little or no mention of chronic flight fatigue, living conditions, or the stress of operating in a hazardous combat environment.

5. Inadequate command, control, and supervision were factors in 13 of the 14 collisions. This is a serious problem area. It was common to have two or more of the following factors present in each mid-air collision:

- Laxity in flight control during formation flying.
- Inadequate planning and improper execution of flare and gun ship operations.
- Absence of or insufficient coordination between services.
- Absence of adequate published SOPs and directives and inadequate dissemination and enforcement of existing rules and procedures.
- Inadequate planning and improper execution of allied airmobile operations.
- Inadequate air traffic control facilities.

All the above factors were brought out in the first midair collision study. It is evident that these supervisory faults must be corrected before Army aviation can significantly reduce the number of midair collisions.

CAUSE FACTORS: In addition to those factors concerning supervision, other cause factors evident in midair collisions during a troop lift/tactical environment are as follows:

- a. Lack of coordination (prior to gun ship, FAC, and VNAF support missions).
- b. Flying with inoperative or turned off navigation/anticollision lights during the hours of darkness.
- c. Lack of communication between aircraft.
- d. Lack of communication and control between aircraft and control towers.
- e. Low ceiling and poor visibility, causing tight restrictive flight patterns in areas of operation.
- f. Violations of regulations and published SOPs, i.e., formation flying and low level flying.
- g. Poor visibility while turning with high-winged fixed wing aircraft.

CONCLUSIONS:

1. There will be no appreciable change in aircraft density in the vicinity of focal points, i.e., landing zones, pickup zones, tactical areas of operation, base camp heliports, etc. The concept of providing airmobility to enhance ground operations results in large numbers of Army helicopters and fixed wing airplanes, as well as numerous aircraft of other services and nations, using the airspace above the ground forces. The majority of midair collisions that occur in Vietnam will occur during daylight hours and there will be no severe restriction to visibility.

2. Immediate command attention must be given to strengthening command and control procedures in

areas of on-going operations. Measures must be initiated which will insure control of the number of aircraft within an operational area, coordination between all combat elements within the area (including the other services), and individual command and control organic elements.

3. There is a vital need for the controlling agencies of focal points, such as airfields, heliports, and navigational facilities, to insure establishment of and compliance with the best possible traffic regulations and procedures.

4. All phases of armed helicopter operations must be analyzed to develop corrective measures for reducing the high susceptibility of armed helicopters to midair collisions.

RECOMMENDATIONS:

1. All Army aircraft be equipped with a collision warning system and high intensity lighting system.

2. One aviator within each element of each flight formation act as the flight safety monitor. He will insure that all aircraft under his supervision maintain the prescribed rotor disk separation.

3. Improved planning and closer coordination between aircraft crews in fire support teams.

4. Increased command emphasis on adhering to recommended limitations for daily and monthly crew-member flight hours.

5. Increased night training for AH-1G pilots.

6. Continuous command emphasis on adherence to published regulations and SOPs.

7. Command emphasis on continuous alertness of all crewmembers to detect other aircraft in the vicinity.

8. Command emphasis on joint operation procedures.

9. Command emphasis on an education program to promote full use of the operational hazard reporting system (DA Form 2696).

ANNEX II

TRAINING

COMPARISON: In the previous midair collision study 25 (45%) of the 56 accidents occurred in a training environment. During this reporting period, three (18%) of the midair collisions occurred in a training environment. This is a decrease of 27%.

FINDINGS:

1. Review of the first midair collision which occurred during a training environment revealed the following:

a. The collision occurred during daylight hours with excellent visibility.

b. Both aircraft were flown solo. The average flight experience of the solo students was 41 hours.

c. A false sense of security of student pilots exists while flying in traffic patterns under the jurisdiction of a control tower.

2. Review of the second midair collision revealed the following:

a. The collision occurred during VFR on top with excellent visibility.

b. The military aircraft was in the process of departing a holding pattern over an intersection.

c. The crew of the military aircraft consisted of highly qualified personnel.

3. Review of the third midair collision revealed the following:

a. The collision occurred at night with 12 miles visibility.

b. Both aircraft were on dual ride training missions with highly qualified instructor pilots on board. One had a rated student pilot and the other had a nonrated student pilot.

CAUSE FACTORS:

1. One student pilot overshot the final turn to his intended lane.

2. One student pilot experienced psychological (preoccupation) factors which contributed to his failure to maintain adequate clearance from the other aircraft.

3. Violation of FARs.

4. Violation of the see-and-be-seen concept.

5. Both pilots in command failed to maintain vigilance in VFR weather conditions.

6. Lack of an operational anticollision light on a civilian aircraft.

7. Failure to yield the right of way to the aircraft on the right, under VFR conditions.

PREVENTION:

1. Efforts at Fort Rucker, Alabama, to eliminate midair collisions have not been oriented toward the worldwide problem, but rather have been directed toward the resolution of problem areas peculiar to that installation's flight training mission. They include the following:

a. Equipment:

(1) Installation of 213 proximity warning devices in the TH-13T instrument training aircraft.

(2) An evaluation of the proximity warning device in the UH-1 aircraft is presently being conducted.

b. Airspace:

(1) Two-week class flow began in October 1967. This greatly reduced the aircraft density at all training facilities.

(2) Staggered launch schedules were established in July 1967.

(3) Fort Rucker Air Traffic Control Plan was developed to reduce possibilities of midair collisions. The plan uses nav aids, radar, and a central control/communications center to provide separation of aircraft. The interim control "HUB" became operational in May 1966.

(4) Specific VFR routes to and from basic instrument training areas were established in September 1967.

(5) Airspace reapportionment was accomplished in August 1967.

(6) Through revised scheduling, night flying density was reduced by one-third in August 1967.

(7) Relocation of training aircraft, to avoid overlapping air routes, was accomplished in September 1967.

(8) A comprehensive "Operational Hazard Report" program is continually evaluated. A thorough follow-up procedure is pursued through safety channels, with vigorous command emphasis.

(9) Airspace coordination conferences and command correspondence have been used in joint education efforts with other users of Alert Area A-211.

(10) Vertically stratified and laterally defined training areas have been designated for separate training requirements. Vertical stratification considers ceiling altitude and provides stratifications predicated on forecast weather.

(11) Flight training maneuvers, not related to landing and takeoff, are not allowed in the base field environment.

(12) Block time departures are in effect.

c. Individual pilot procedures:

(1) Standard clearing turns and safety procedures prior to takeoff and landing are stressed in MOI and student training.

(2) Department SOPs and Center regulations define airspace structure and approved procedures for using all airspace.

(3) An inadvertent IFR procedure was instituted to avoid possibility of midair collisions in marginal weather.

d. Similar airspace allocation and pilot procedures were established at the USAAVNSE at Hunter AAF and the USAPHC at Fort Wolters.

CONCLUSIONS:

1. Although the see-and-be-seen concept is the primary method presently available for preventing midair collisions, the concept is inadequate and needs augmentation.

2. Careful consideration should be given to the use of "buddy" riders and their value in preventing midair collisions. This would increase the number of eyes available for surveillance outside the aircraft.

3. Currently authorized anticollision light systems are inadequate. Consideration should be given to the use of high intensity strobe lights to increase conspicuity during daylight training operations.

RECOMMENDATIONS:

1. All Army aircraft be equipped with a collision warning system and high intensity lighting system.

2. All aviators should avoid flying into high density areas whenever possible.

3. All aviators, while flying in high density areas, should use FAA radar advisory when available.

4. Supervisors at all installations should study and evaluate their training operations and decide if layers, corridors, and designated training areas would be advantageous in their training environment.

5. All aviators should study and know the contents of the ARs and FARs regarding airspace separation.

ANNEX III

MIDAIR COLLISION PROFILE

One of the aircraft involved will be a UH-1 and the collision will occur between two aircraft during daylight hours with a visibility of 10 to 20 miles. There will be 3 crewmembers per collision aircraft or 6 crewmembers per mishap. There will be 6.2 fatalities (both crew and passengers) in each mishap. The aircraft will be involved in a tactical operation. The crew will have performed 4.1 hours of flight prior to the collision and will have been on duty 5.5 hours of the duty day. The aircraft involved will not be in formation. Neither will they be climbing, nor turning, but will simply converge. They will not be

in radio communication with each other. The collision will occur between the altitudes of 500 feet and 2,000 feet absolute. The experience level (flight time) of the aviators in command will not be a factor, but the total flight time for a 30-day period will be. The aviator in command will have an excess of 90 hours for a 30-day period. Inadequate command and control or lack of supervision will be present. Some degree of violation of instructions or procedures, or the violation of the principles of good airmanship (see-and-be-seen) will exist.